

In The Claims:

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1           1. A method for transmitting  
2 communications signals to a plurality of mobile  
3 terminals, comprising:  
4           processing a received signal at a ground  
5 hub;  
6           radiating said signal through multiple  
7 paths to at least two satellites;  
8           re-radiating said signal from said at least  
9 two satellites to an intended mobile terminal;  
10          perturbing the inclination and eccentricity  
11 of said at least two satellites relative to the same  
12 geosynchronous reference orbit;  
13          whereby the periods of geosynchronous  
14 orbits of said at least two satellites remain  
15 substantially constant.

1           2. The method of claim 1, further  
2 comprising:  
3           radiating a signal from said intended  
4 mobile terminal to said at least two perturbed  
5 satellites;  
6           re-radiating said signal from said at least  
7 two perturbed satellites to said ground hub.

1           3. The method of claim 2, further  
2 comprising:  
3           determining a relationship between said  
4 inclination and said eccentricity of said satellites

5 such that they appear to move at a constant speed  
6 along circular paths whose centers are located at the  
7 position of a hypothetical reference satellite in an  
8 unperturbed geosynchronous orbit.

1 4. The method of claim 3, further  
2 comprising:

3 maintaining the geometry of said cluster of  
4 at least two satellites such that the distances  
5 between any two of said satellites is relatively  
6 constant.

1 5. The method of claim 4, further  
2 comprising:

3 adding additional satellites to said at  
4 least two satellites to augment the satellite  
5 constellation.

1 6. The method of claim 4, wherein the  
2 conditions for circular apparent motion of the  
3 perturbed satellite relative to said satellite  
4 constellation center is approximated by the  
5 following:

$$\sin i = 2\epsilon$$
$$t_o = \pm \frac{1}{4} T_{GEO}$$

1 7. A mobile wireless communication  
2 system, comprising:

3 a satellite constellation consisting of a  
4 plurality of satellites each in a slightly perturbed  
5 geosynchronous orbit;

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6 each of said plurality of satellites being  
7 capable of relaying signals between the ground hub  
8 and the plurality of user terminals in either  
9 direction;

10 whereby as said satellite constellation  
11 appears to rotate the apparent inter-satellite  
12 spatial relationships are maintained.

1 8. The mobile wireless communication  
2 system of claim 7, wherein each of said plurality of  
3 satellites has its inclination and eccentricity  
4 perturbed relative to a common geosynchronous  
5 reference orbit.

1 9. The mobile wireless communication  
2 system of claim 8, wherein the orbit of each of said  
3 plurality of satellites is perturbed such that it  
4 appears to move at a constant speed along a circular  
5 path as viewed by a single user.

1 10. The mobile wireless communication  
2 system of claim 7, wherein the respective distances  
3 among the said plurality of satellites is  
4 substantially constant.

1 11. The mobile wireless communication  
2 system of claim 9, wherein the conditions for  
3 circular apparent motion of the perturbed satellite  
4 relative to said satellite constellation center is  
5 approximated by the following:

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$$\sin i = 2\varepsilon$$

$$t_o = \pm \frac{1}{4} T_{GEO}$$

6

1 12. The mobile wireless communication  
2 system of claim 7, wherein in order for coherent  
3 reception of signals by their intended user, said  
4 intended user's location must be determined to within  
5 a specified tolerance  $\varepsilon_x$ , which is determined  
6 according to the following equation:

$$\varepsilon_x < \frac{\varepsilon_{tol} \lambda_{min} r_{min}}{\Delta D_{x max}}$$

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1 13. The mobile wireless communication  
2 system of claim 7, wherein in order for incoherent  
3 reception of signals from interfering (non-intended)  
4 users, said interfering users must be displaced at  
5 least a distance

$$\Delta x_{min} \geq \frac{cr_{max}}{2W_N \delta \Delta D_{x min}}$$

6

7 from the user receiving the signal

1 14. The mobile wireless communication  
2 system of claim 11, wherein the apparent motions of  
3 said plurality of satellites in said satellite  
4 constellation can be arranged to appear circular as  
5 perceived from any one point in the coverage area.

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1 15. A method for establishing a link  
2 between a ground hub and a plurality of mobile  
3 terminals, comprising:

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$$\sin i = 2\varepsilon$$

$$t_o = \pm \frac{1}{4} T_{GEO}$$

1 19. The method of claim 15 wherein in  
2 order for incoherent reception of signals from  
3 interfering (non-intended) users, said interfering  
4 users must be displaced at least a distance

$$\Delta X_{MIN} \geq \frac{C_{r_{MAX}}}{2W_N \delta \Delta D_{xMIN}}$$

5 from the user receiving the signal.

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6 20. The method of claim 15, wherein in  
2 order for coherent reception of signals by their  
3 intended user, said intended user's location must be  
4 determined to within a specified tolerance  $\varepsilon_x$ , which  
5 is determined according to the following equation:

$$\varepsilon_x \ll \frac{\varepsilon_{tol} r_{min} r_{min}}{\Delta_{x min}}$$

1

4 preprocessing a received signal at said  
5 ground hub;

6 transmitting said signal through a  
7 plurality of satellites in a satellite constellation  
8 to an intended one of the mobile terminals;

9 perturbing the inclination and eccentricity  
10 of said plurality of satellites relative to a common  
11 geosynchronous reference orbit; and

12 determining a relationship between said  
13 inclination and said eccentricity of said plurality  
14 of satellites such that they appear to move at a  
15 constant speed along circular paths where centers are  
16 located at a position defined by a hypothetical  
17 reference satellite in an unperturbed geosynchronous  
18 orbit.

1 16. The method of claim 15, further  
2 comprising:

3 maintaining the periods of geosynchronous  
4 orbit of said plurality of satellites substantially  
5 constant.

1 17. The method of claim 15, further  
2 comprising:

3 maintaining the apparent inter-satellite  
4 spatial relationships between said plurality of  
5 satellites as they appear to rotate.

1 18. The method of claim 15, wherein said  
2 relationship is approximated by the following:

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